"Arlie M. Skov" <askov@earthlink.net> on 10/19/2001 11:38:51 AM

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OCT 19 2001

To: ymp_sr@ymp.gov
cc:

Subject: Comments, S & ER

Part of Records Package / Supplement / Correction

Carol Hanlon,

Attached are comments on the S & ER. I will also send a copy by fax today, and will mail hard copy which will not arrive in time for today's deadline for comments.

Arlie M. Skov

- Yucca Mt.Comments, 10-19-01.doc

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October 19, 2001

Carol Hanlon
S&ER Products Manager
US DOE
Yucca Mountain Site Characterization Office
PO Box 30307
North Las Vegas, NV 789036-0307
Fax Number: 1-800-967-0739

Re: Comments on Yucca Mountain Science and Engineering Report Issued May 2001

Dear Carol,

I have studied the subject report with considerable interest and in some detail in those areas where my own experience and expertise (see end note) might have some relevance.

Overall, in my judgment, the DOE has done a commendably comprehensive and complete analysis of all of the relevant factors involved in meeting the requirements for a recommendation by the Secretary of Energy to proceed with the initiation of long-term storage of spent nuclear fuel and high-level radioactive waste at Yucca Mountain.

Some uncertainties cannot be adequately resolved. It is not possible to predict the future course of mankind's activities over the next 10,000 years, nor is it possibly to predict local climates over the same time span, with or without consideration of possible human-caused global warming. Since these effects can be neither adequately predicted nor effectively mandated by Congress, I believe that continued long-term monitoring may be necessary, but this need should not preclude an immediate decision to proceed.

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The uncertainty of primary concern to me is the possibility of ground water contamination by radionuclides with time following the breakdown of natural and engineered barriers in the site itself. While these barriers are superbly designed, I think it is inevitable that some day, before or after the arbitrary 10,000 year time frame, through human intervention either accidental or on purpose, drastic climate change, seismic or volcanic activity, or just plain corrosion and deterioration of materials, the barriers will fail, and some level of radioactivity may be released into the underlying water table.

This risk is likely minuscule, but it is worth examining how this risk might impact site selection, and to me, the overall characteristics of the Yucca Mountain site mitigate this risk substantially. The same risk precludes the selection of other sites, most notably the current scattered storage locations near populous areas. Yucca Mountain is in a geologically closed basin, so any radio nuclides released into the groundwater would be geographically constrained, a necessary condition. Second, Yucca Mountain is located in an arid, lightly populated region, further limiting exposure to this potential risk. Third, Yucca Mountain abuts the Nevada Test Site where numerous nuclear weapons tests over the past half-century have already left radioactive waste. Fourth, most of the surrounding land is owned or controlled by the Federal Government.

Contrast these characteristics also in light of all possible alternatives, most particularly the current location of spent nuclear fuel, stored indiscriminately at over a hundred sites, many near population centers, none in locations with the mitigating factors noted above, and all possessing far greater risk of ultimate groundwater contamination.

And lastly, the events of September 11 emphasize the ease with which terrorists can destroy our infrastructures, our economy, and our confidence in our national security. This factor alone mandates the rapid movement of spent nuclear fuel underground in a central location to avoid its possible use as a further terrorist weapon.

Sincerely yours,

Arlie M. Skov

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End Note: My background is in petroleum engineering in which a critical requirement is an understanding of the flow of fluids in underground rock formations, whether fractured or not. My educational background is a B.S. in Petroleum Engineering from the University of Oklahoma in 1956 (with special distinction), and I completed the Basic Advanced Management Program at the University of Virginia in 1966. I have worked in both operations and research, retiring from BP in 1992 as a Technology Director. In 1991, I served as President of the International Society of Petroleum Engineers (SPE), and I am both a Distinguished and Honorary Member of that Society and of AIME. I am also a member of the National Petroleum Council, at the invitation initially of the Honorable Hazel O'Leary and of each subsequent Secretary of Energy.

A Specific Comment on the Definition of Permeability in the Glossary of the Yucca Mountain Science and Engineering Report

Page G-20: The definition of permeability is incomplete and does not fully depict the complexities of fluid flow in porous media. The first sentence is fine, but a better second sentence, and a new third one, in the definition would be: (additions underlined) "Permeability depends on the substance, <u>i. e., fluid</u>, transmitted (oil, air, water, etc.), and on the size and shape of the pores, joints, and fractures in the medium, and the manner in which they are interconnected. <u>Importantly, for the case of multi-phase flow, permeability is also dependent upon the relative saturations of the different phases (i. e., liquid water, steam, air, etc.) which may be present, and upon the various wettability characteristics both between and amongst the phases and between them and the rock or substances containing them, as wettability and interfacial tension influence capillary effects as well as relative permeability to the various phases and/or fluids.</u>

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